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E-MAIL AND FIRST CLASS MAIL
Mr. Kevin Schilling
Air Quality Division
Idaho Department of Environmental Quality
1410 North Hilton
Boise, ID 83706

Subject: Dispersion Modeling Protocol
Biopol Laboratory, Inc.
Post Falls, Idaho
IES Project No. EHS07308.01

Dear Mr. Schilling:

On behalf of Biopol Laboratory, Inc. (Biopol), IES Engineers is pleased to submit this protocol for conducting the air dispersion modeling for the proposed Biopol facility in Post Falls, Idaho. The purpose of the modeling is twofold: (i) to determine the potential impacts of the proposed construction on the ambient air quality; and (ii) to establish emission limits to be incorporated in a Facility Emission Cap (FEC) permit.

As you know, Biopol will be submitting an application for a FEC permit under the Permit-to-Construct (PTC) program. The project schedule is very tight; therefore, we would appreciate the Department's expeditious review of this protocol. Additionally, as we discussed during our March 7, 2007, conference call, the Department will be providing the following information, which we would also appreciate obtaining as soon as possible:

- Five years of pre-processed meteorological data for the Post Falls area
- Background ambient air quality concentrations
- Source parameters for any nearby facilities that may need to be included in the model

This protocol is being submitted to satisfy the requirements of IDAPA 58.01.01.175 through181. The protocol follows the Department's *Modeling Protocol Template* as well as the appropriate requirements contained in the *State of Idaho Air Quality Modeling Guideline*. The following sections are included in this protocol:

- Project Description and Purpose of Modeling
- Modeling Applicability Assessment – including criteria pollutants and toxic air pollutants (TAPs)
- Modeling Analyses Methodology
- Model Input Data
- Outline for Modeling Report

1.0 PROJECT DESCRIPTION AND PURPOSE OF MODELING

Biopol Laboratory, Inc. (Biopol) is proposing to construct a new allergen purification facility in an industrial park on Lochsa Street in Post Falls, Idaho. The UTM coordinates of the approximate center of the facility are 499,676 meters east and 5,282,972 meters north. The facility will purify harvested pollen from timothy hay and other allergens for further processing elsewhere to produce vaccines for individuals with allergies. The facility will be constructed in phases; the modeling analysis will provide for the equipment that will be included in all phases anticipated over the next five years.

Emission sources at the facility will include boilers, an electric generator, water heaters, rooftop air handling units (which include pre-heating and humidification sections), house vacuum systems, laboratory hood exhaust vents, and process operations, which include a fluidized bed dryer and a filter/dryer. These operations will emit criteria pollutants: oxides of nitrogen (NO_x), carbon monoxide (CO), sulfur oxides (SO_x), volatile organic compounds (VOC), particulate matter; and toxic air pollutants (TAPs): acetone, ethanol, isopropyl alcohol, methanol, tetrachloroethylene (perchloroethylene), and petroleum ether. Emission control equipment is used to reduce emissions from two process sources: a high efficiency particulate air filter (HEPA) on the fluidized bed dryer/separator, and a vent condenser on the filter/dryer (de-fatting operation), both of which are associated with the Timothy Pollen processing operations.

Based on preliminary emission calculations, the proposed facility will be a minor source for all pollutants. In order to obtain the maximum operating flexibility, Biopol will be applying for a FEC permit, which will establish caps for each regulated pollutant and will allow the installation of currently unspecified equipment without having to re-open the permit. As part of the FEC requirements, air dispersion modeling must be performed for particulate matter less than or equal to 10 micrometers (PM_{10}), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and CO. Additionally, the model will be used to demonstrate that emissions of perchloroethylene (a TAP) will not cause an exceedance of the Acceptable Ambient Concentration (AACs) set forth in IDAPA 58.01.01.585 and 586.

The modeling analysis is being conducted to: (i) demonstrate that at the worst-case scenario of emissions and exhaust parameters, emissions under the facility emission cap will not cause an exceedance of the National Ambient Air Quality Standards (NAAQS) for PM_{10}, SO_2, NO_2, and CO; and (ii) demonstrate that emissions of perchloroethylene (the only TAP that exceeds the Screening Emission Level in IDAPA 58.01.01.586) will not exceed the AAC. In establishing the FEC, we will identify a number of scenarios of stack heights and locations, exhaust gas directions and velocities, and emission rates. We will use the model to evaluate each of these scenarios and identify the worst-case scenario from an ambient air quality perspective. Accordingly, future growth at the facility can be accommodated with the assurance that the emissions will not cause adverse impacts as long as they remain below the FEC.

2.0 EMISSION DATA

Biopol is proposing to limit its combined emissions of all regulated pollutants to between one and ten tons per year. Preliminary estimates of the potential facility-wide emissions are as follows:

Pollutant	Preliminary Estimate (tpy)	Sources
PM_{10}	0.80	Natural gas and diesel fuel combustion, process sources
SO_2	0.59	Natural gas and diesel fuel combustion
NO_2	3.08	Natural gas and diesel fuel combustion
CO	2.97	Natural gas and diesel fuel combustion
Perchloroethylene	0.08	Process sources

Peak, or worst-case emissions will be used in the dispersion analysis. As a conservative measure, we propose to model the peak emissions assuming 8,760 hours of operation per year. For sources whose design does not allow continuous operation (e.g., emergency electric generator), separate model runs will be conducted to demonstrate worst-case short-term and long-term ambient impacts.

All facility emission rates are well below the applicability thresholds of the Prevention of Significant Deterioration (PSD) and non-attainment New Source Review programs.

3.0 MODELING APPLICABILITY ASSESSMENT

3.1 Criteria Pollutant Modeling Applicability

A modeling analysis is generally required with each permit application for new construction with emissions exceeding the modeling thresholds. In Biopol's case, emissions are below the Department's internal modeling thresholds; however, since Biopol is applying for a FEC permit, modeling is required for criteria pollutants (PM_{10}, SO_2, NO_2, and CO). As we discussed, lead and volatile organic compounds (VOCs) are not being included in the analysis. The only source of lead emissions would be trace quantities from combustion of natural gas or diesel fuel. VOC emissions are low (approximately 0.69 tons per year) and there is no viable model available for modeling VOC emissions from individual facilities.

All stationary sources at the facility with the potential to emit PM_{10}, SO_2, NO_2, or CO will be included in the analysis, except that PM_{10} emissions from vehicle traffic on the facility property will not be included. "Trivial" activities, as defined by the Department, will also not be included

in the assessment. The facility roadways and parking lots will be paved, and given the nature of the operations at the facility, emissions from traffic will be minimal.

3.2 TAPs Modeling Applicability

Dispersion analysis of TAP emissions associated with the project is required if total emissions increases exceed TAP-specific regulatory screening emission levels (ELs). In Biopol's case, perchloroethylene is the only TAP for which emissions exceed the EL for carcinogens set forth in IDAPA 58.01.01.586; therefore, an air dispersion analysis is required for this pollutant. Perchloroethylene will be used in Timothy pollen processing and the Small Scale Manufacturing (SSM) operations and will be exhausted to the atmosphere through the laboratory ventilation system.

4.0 MODELING METHODOLOGY

4.1 Model Used

The American Meteorological Society (AMS) and the U.S. Environmental Protection Agency (EPA) jointly formed the AMS/EPA Regulatory Model Improvement Committee (AERMIC) to develop an accurate air quality model. They developed the AERMIC Dispersion Model (AERMOD). The AERMOD model (Version 07026) is accepted for regulatory analyses and is the recommended model for determining ground-level ambient air concentrations in all types of terrain. We propose to use AERMOD for the criteria and TAP pollutant analyses.

Under stable conditions, AERMOD uses a steady-state, Gaussian plume equation to calculate ambient concentrations from stacks. In unstable conditions, AERMOD uses a non-Gaussian probability density function to calculate ambient concentrations. Input variables to the model include: emission rates, stack heights, meteorological data, receptor locations (including sensitive receptors such as schools or hospitals), terrain elevations, and stack gas characteristics. The model can also be used to evaluate the effects of aerodynamic wakes and eddies that are formed by buildings and other structures on plume dispersion (PRIME model).

Review of a topographic map of the area around the proposed Biopol facility indicates that some of the receptors are in complex terrain. AERMOD has been developed to incorporate complex terrain considerations into the model output.

EPA's Building Profile Input Program (BPIP) algorithms will be used to determine the impacts of building downwash. Buildings on site will be included in the analysis; there are no significant structures off site. The results of the BPIP analysis will be incorporated into the AERMOD model.

IES uses a purchased software package (Trinity Breeze, Version 5.2.1) to interface with AERMOD to assist in setting up and running the model. However, we anticipate running the model without a graphical user interface as well.

4.2 Criteria Pollutant Modeling Methodology

This is a new facility; therefore, all proposed emission sources that potentially emit criteria pollutants (PM_{10}, SO_2, NO_2, and CO) will be included in the analysis, except that PM_{10} emissions from the paved roads will not be included.

As we discussed, other nearby sources (those within approximately 1,000 feet) will be included in the modeling analysis. Buck Knives is located adjacent to the property. As requested, we provided UTM coordinates (see Section 1.0) so that the Department can provide emissions, coordinates, and exhaust parameters for nearby sources that should be included in this analysis.

Modeling will be conducted to demonstrate compliance with the following ambient concentrations and averaging periods:

Pollutant	**Averaging Time**	**Standard ($\mu g/m^3$)**	**Model Value Used**
CO	1-hour	40,000	Second highest hourly value (i.e., not to be exceeded more than once a year)
	8-hour	10,000	Second highest hourly value (i.e., not to be exceeded more than once a year)
NO_2	Annual	100	Maximum value (i.e., not to be exceeded in any calendar year)
SO_2	3-hour	1,300	Second highest hourly value (i.e., not to be exceeded more than once a year)
	24-hour	365	Second highest hourly value (i.e., not to be exceeded more than once a year)
	Annual	80	Maximum value (i.e., not to be exceeded in any calendar year)
PM_{10}	24-hour	150	Second highest daily value (i.e., not to be exceeded more than once a year)
	Annual	50	Maximum value (i.e., not to be exceeded in any calendar year)

Background concentrations will be included in the analysis. The Department will provide the background concentrations for each modeled criteria pollutant (PM_{10}, SO_2, NO_2, and CO).

4.3 TAP Modeling Methodology

A screening-level dispersion analysis will be conducted to demonstrate that the maximum off-site concentration of perchloroethylene will not exceed the AAC (2.1 $\mu g/m^3$ averaged over a 1-year period). We will model the maximum perchloroethylene emission rate and the worst-case dispersion parameters. The modeling will be conducted using AERMOD and the highest annual concentration will be compared against the AAC.

5.0 MODEL INPUT DATA

Table 1 presents a summary of the model input parameters that are proposed for the analysis using AERMOD.

The ambient air boundary for the facility is the property line. The facility is located in an industrial park and is not used by the general public. Security measures, including signs, will be implemented to discourage public access to the property. This was discussed with the Department during a pre-application meeting on January 31, 2007; the Department concurs with this approach.

A Cartesian receptor grid and a discrete receptor grid will be used to determine the maximum off-site impact. Based on screening-level model runs conducted using EPA's SCREEN 3 model, the anticipated maximum off-site concentration is well within 1 kilometer of the facility. A receptor grid extending 3 kilometers in all directions from the approximate center of the facility is proposed. The grid spacing for the grid is 50-meters. Receptors will be placed along the property line at a minimum spacing of 25 meters.

Table 1
Summary of AERMOD Model Input Parameters for
Air Dispersion Analysis

Model Option	Value Selected
Calculate concentration or deposition	Concentration
Rural or urban option	Rural; specific breakdown, by sector, to be provided by DEQ.
Dry or wet depletion	None
Regulatory default option	Yes
Averaging period	PM_{10}: 24-hour and annual CO: 8-hour and 1-hour SO_2: 3-hour, 8-hour, and annual NO_2: annual TAP: annual
Meteorological data	Data to be provided by DEQ.
Wind profile exponents	Default
Vertical temperature gradients	Default
Grid system	Discrete receptors every 25 m at property line and Cartesian grid system as 3 km around the plant at 50-m spacing.
Terrain elevations	Elevated; elevations are imported from 7.5-Minute USGS Digital Elevation Models at 30 m resolution
Flagpole receptors	Option not used
Building wake effects	Yes, as determined by EPA's BPIP model and incorporated into AERMOD.

5.1 Meteorological Data

Based on our recent discussions, the Department will provide meteorological data for the most recent five-year period, to be used in the AERMOD analysis. The Department has determined that these data are representative of the Post Falls area. It is our understanding that the Department has already processed the meteorological data.

5.2 Emission Release Parameters

Source parameters will be based on anticipated worst-case information, such as emission rates and release parameters. IES anticipates performing several modeling runs to ensure that the worst-case release scenario has been established. If the worst-case parameters include a horizontal release, vertical release with a rain cap, volume or area source, IES will consult with the Department's modeling staff.

5.3 Elevation Data

United States Geological Survey (USGS) Digital Elevation Model (DEM) files will be imported to determine elevations. 7½-minute DEMs with a resolution of 30 meters will be used. Based on the size of the proposed receptor grid, the Post Falls, Idaho and Liberty Lake, Washington-Idaho quadrangle DEM files will be used. Copies of the actual DEM data used in the analysis can be provided with the modeling report.

6.0 TECHNICAL REPORT

A technical report will be prepared and included as a section with the FEC application discussing the results of the air dispersion analysis. This report will include the following information:

- Introduction/Background – including purpose of modeling analysis
- Discussion of Methodology – including justification for model
- Input Parameters – including source input data, building downwash information, receptor locations, and meteorological data in electronic format.
- Results of Ambient Impact Analysis – including maximum off-site concentrations, and comparisons with the AAC or NAAQSs. Copies of the model input and output files will also be included in electronic format.

We greatly appreciate your efforts in expediting review of this protocol. Please do not hesitate to contact Bob Schlosser or me if you should have any questions.

Sincerely,

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Principal Project Manager

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